Thyristor Surface Mount, Phase Control SCR, 8 A

TO-263AB (D²PAK)

2, 4
Anode

1   3
Cathode   Gate
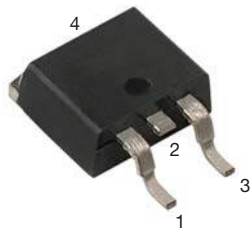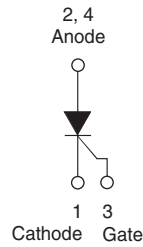
FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Designed and qualified according JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Input rectification and crow-bar (soft start)
- Vishay input diodes, switches and output rectifiers which are available in identical package outlines

DESCRIPTION

The VS-12TTS08SPbF High Voltage Series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications. The glass passivation technology used has reliable operation up to 125 °C junction temperature.

PRODUCT SUMMARY

Package	TO-263AB (D²PAK)
Diode variation	Single SCR
$I_{T(AV)}$	8 A
V_{DRM}/V_{RRM}	800 V
V_{TM}	1.2 V
I_{GT}	15 mA
T_J	-40 to +125 °C

OUTPUT CURRENT IN TYPICAL APPLICATIONS

APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
Capacitive input filter T_A = 55 °C, T_J = 125 °C, common heatsink of 1 °C/W	13.5	17	A

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	8	A
$I_{T(RMS)}$		12.5	
V_{RRM}/V_{DRM}		800	V
I_{TSM}		110	A
V_T	8 A, T_J = 25 °C	1.2	V
dV/dt		150	V/µs
dI/dt		100	A/µs
T_J	Range	-40 to +125	°C

VOLTAGE RATINGS

PART NUMBER	V_{RRM}, MAXIMUM PEAK REVERSE VOLTAGE V	V_{DRM}, MAXIMUM PEAK DIRECT VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
VS-12TTS08SPbF	800	800	1.0

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	T_C = 108 °C, 180° conduction, half sine wave		8	A
Maximum RMS on-state current	$I_{T(RMS)}$			12.5	
Maximum peak one-cycle non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied, T_J = 125 °C		95	
		10 ms sine pulse, no voltage reapplied, T_J = 125 °C		110	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied, T_J = 125 °C		45	A^2s
		10 ms sine pulse, no voltage reapplied, T_J = 125 °C		64	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied, T_J = 125 °C		640	$A^2\sqrt{s}$
Maximum on-state voltage drop	V_{TM}	8 A, T_J = 25 °C		1.2	V
On-state slope resistance	r_t	T_J = 125 °C		16.2	mΩ
Threshold voltage	$V_{T(TO)}$			0.87	V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	T_J = 25 °C	V_R = Rated V_{RRM}/V_{DRM}	0.05	mA
		T_J = 125 °C		1.0	
Typical holding current	I_H	Anode supply = 6 V, resistive load, initial I_T = 1 A, T_J = 25 °C		30	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C		50	
Maximum rate of rise of off-state voltage	dV/dt	T_J = T_J max., linear to 80 %, V_{DRM} = R_g - k = Open		150	V/µs
Maximum rate of rise of turned-on current	dI/dt			100	A/µs

TRIGGERING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak gate power	P_{GM}		8.0	W
Maximum average gate power	$P_{G(AV)}$		2.0	
Maximum peak positive gate current	+ I_{GM}		1.5	A
Maximum peak negative gate voltage	- V_{GM}		10	V
Maximum required DC gate current to trigger	I_{GT}	Anode supply = 6 V, resistive load, T_J = - 65 °C	20	mA
		Anode supply = 6 V, resistive load, T_J = 25 °C	15	
		Anode supply = 6 V, resistive load, T_J = 125 °C	10	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, T_J = - 65 °C	1.2	V
		Anode supply = 6 V, resistive load, T_J = 25 °C	1	
		Anode supply = 6 V, resistive load, T_J = 125 °C	0.7	
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 125 °C, V_{DRM} = Rated value	0.2	
Maximum DC gate current not to trigger	I_{GD}		0.1	mA

SWITCHING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical turn-on time	t_{gt}	T_J = 25 °C	0.8	µs
Typical reverse recovery time	t_{rr}	T_J = 125 °C	3	
Typical turn-off time	t_q		100	

For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com

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THERMAL AND MECHANICAL SPECIFICATIONS

| PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range		T_J, T_{Stg}		-40 to +125	°C
Maximum thermal resistance, junction to case		R_{thJC}	DC operation	1.5	°C/W
Maximum thermal resistance, junction to ambient		R_{thJA}		62	
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased	0.5	
Approximate weight				2	g
				0.07	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style D^{2}PAK (SMD-220)	12TTS08S	
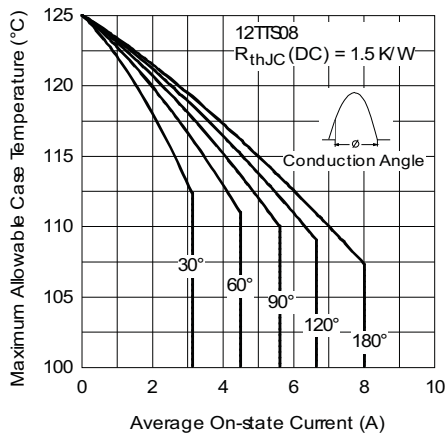
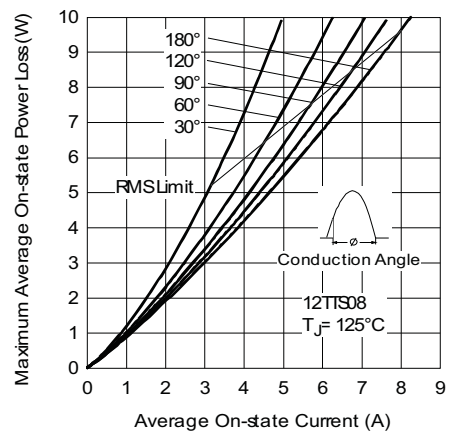Fig. 1 - Current Rating Characteristics

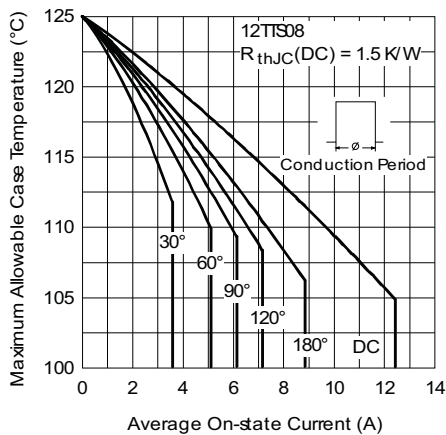Fig. 3 - On-State Power Loss Characteristics

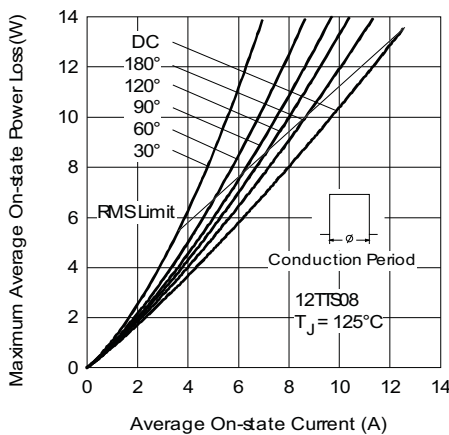Fig. 2 - Current Rating Characteristics

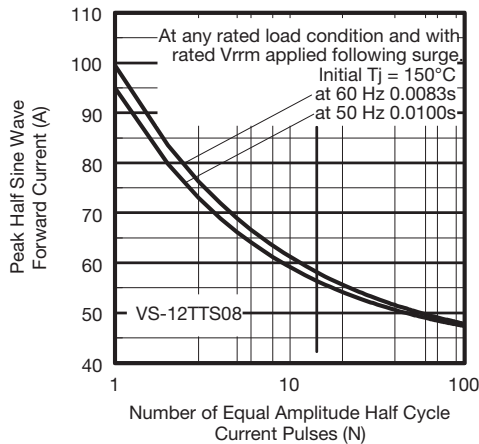Fig. 4 - On-State Power Loss Characteristics
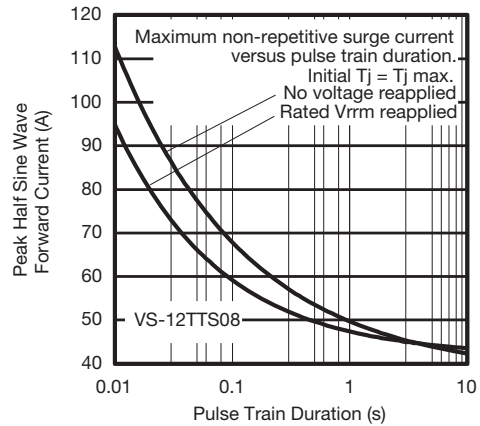
Fig. 5 - Maximum Non-Repetitive Surge Current

Fig. 6 - Maximum Non-Repetitive Surge Current

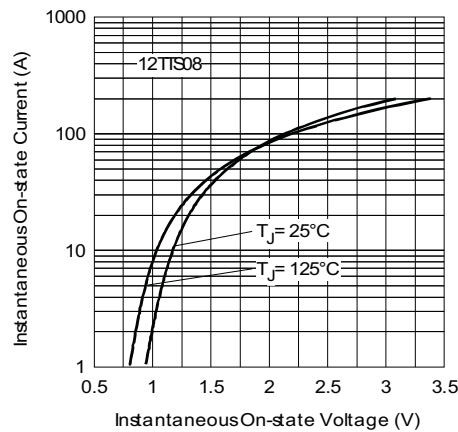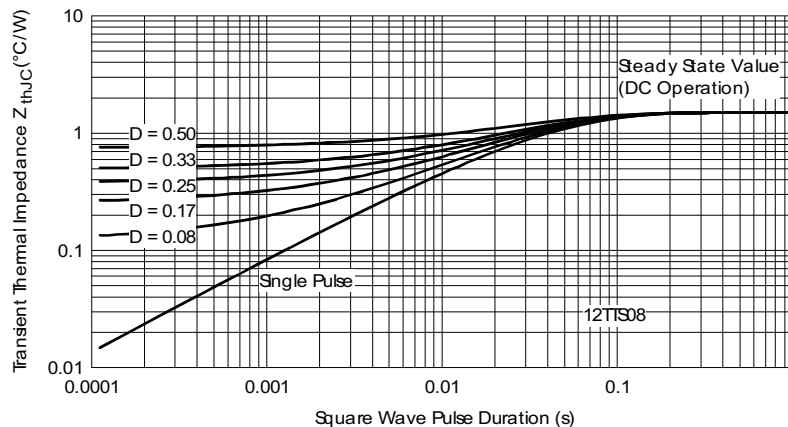Fig. 7 - On-State Voltage Drop Characteristics

Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	12	T	T	S	08	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

1	-	Vishay Semiconductors product
2	-	Current rating (12.5 A)
3	-	Circuit configuration:
		T = single thyristor
4	-	Package:
		T = TO-220AC
5	-	Type of silicon:
		S = standard recovery rectifier
6	-	Voltage rating (08 = 800 V)
7	-	S = TO-220 D^{2}PAK (SMD-220) version
8	-	• None = tube
		• TRL = tape and reel (left oriented)
		• TRR = tape and reel (right oriented)
9	-	PbF = lead (Pb)-free

ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-12TTS08SPbF	50	1000	Antistatic plastic tubes
VS-12TTS08STRRPbF	800	800	13" diameter reel
VS-12TTS08STRLPbF	800	800	13" diameter reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D²PAK (SMD-220)

Detail "A"
Rotated 90 °CW
Scale: 8:1

View A - A

Section B - B and C - C
Scale: None

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

Notes

[1] Dimensioning and tolerancing per ASME Y14.5 M-1994
[2] Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
[3] Thermal pad contour optional within dimension E, L1, D1 and E1
[4] Dimension b1 and c1 apply to base metal only
[5] Datum A and B to be determined at datum plane H
[6] Controlling dimension: inch
[7] Outline conforms to JEDEC® outline TO-263AB

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